PRESS BULLETIN 488 *March, 1936*

UNIVERSITY OF FLORIDA
AGRICULTURAL EXPERIMENT STATION
WILMON NEWELL, Director
GAINESVILLE

IMPERIAL ... CO
29 APR. 1936
INSTITUTE

ZINC SULPHATE SPRAYS FOR VEGETABLE CROPS

By G. R. TOWNSEND
Associate Plant Pathologist, Everglades Experiment Station

Abnormal conditions of several crops growing in the Southern Coastal Plains have been found to be caused by a deficiency of available zinc in the soils. Experiments have shown that these abnormalities can be overcome by applying zinc sulphate to the soil, or by spraying the plants with a solution of this material. Pecan, tung and citrus trees and corn have responded to one or both of these methods of treatment.

More recently, the failure of beans growing on saw-grass soil in the Florida Everglades has been traced to a lack of zinc. Such failure has not been observed on the older soils of the Lake Okeechobee region, but has come to the attention of the Everglades Experiment Station only on newly cleared land at some distance from the lake. While zinc sulphate may be found useful for vegetable crops throughout the state, its value has been demonstrated only for the area of peat soil in the Everglades lying more than two miles from the shores of Lake Okeechobee.

The symptoms of zinc deficiency in beans are a yellowing and withering of the foliage, followed in the most severe cases by the death of the plant. Beans will grow normally on zinc-deficient soil for three or four weeks, but after that period the plants cease to grow, become pale, and the leaves develop longitudinal streaks of dead tissue. The principal veins remain green longer than the rest of the leaf. In the final stages of the disease entire branches of the plant collapse and wither.

Zinc deficiency in beans differs from manganese deficiency which occurs chiefly on burned peat or on marl soils. Manganese deficiency develops earlier in the growth of the plant than zinc deficiency, and is characterized at first by a mottled yellowing. In the later stages of manganese deficiency bean leaves have a brilliant yellow color and are marked by rows of black dots along the principal veins. Furthermore, beans affected by manganese deficiency show response to treatment in 30 hours, while four or five days are required for definite response to be seen in plants treated for zinc deficiency.

Copper deficiency which occurs in raw saw-grass soils causes symptoms on beans which are not readily distinguished from

those of zinc deficiency. Copper deficiency seems to be of a more transitory nature than either zinc or manganese deficiencies.

Zinc sulphate may be dissolved in water and sprayed on plants with knapsack sprayers or power driven machines. In the first tests five pounds of 89 percent zinc sulphate were dissolved in 50 gallons of water. This was adequate to correct the deficiency in beans and did not burn the foliage. Subsequent experience of growers has shown that two pounds of 89 percent zinc sulphate in 50 gallons of water is fully effective. The tests which have been conducted with vegetable crops have shown no need to add lime to the spray. Zinc sulphate may be added to either bordeaux mixture or manganese sulphate solutions if these sprays are being used. However, the effectiveness of the zinc or manganese sprays probably is greater when they are not mixed with other materials. Some recommended formulas are given below.

2 pounds 89% zinc sulphate
50 gallons water

2 pounds 89% zinc sulphate
4 pounds 83% manganese sulphate
50 gallons water

2 pounds 89% zinc sulphate
50 gallons 2-3-50 bordeaux mixture

The proper time to apply zinc sulphate sprays is before the crop shows the need for treatment. This can be done if previous experience has shown the land to be deficient in zinc. It is best to make the application before the crop is three weeks old. Recovery of diseased plants has been observed when they were five weeks old before the spray was applied. Usually a second application will not be needed.

Plants which have been very sickly and stunted have been observed to recover and show a luxuriant growth within two to three weeks from the time of application. Beans which respond in this manner will yield a normal crop, whereas without spraying the crop may be a failure.

Cabbage, peas and potatoes also have been observed to fail on zinc deficient saw-grass soil, and these plants also respond to zinc sprays. In general the symptoms are similar to those on beans. The plants grow normally for two or three weeks, but later show a loss of color and sudden blighting of portions of leaves, or wilting of the entire plant. When peas and cabbage are sprayed a soap spreader should be added to the spray.

Zinc sulphate can be obtained from dealers in agricultural supplies. Its cost is approximately the same as that of bluestone and manganese sulphate. There are several grades of zinc sulphate on the market. These differ in the amount of water which they carry in combination with the zinc. The zinc sulphate with the least water is a pure white salt. It contains the equivalent of 36 percent metallic zinc, or 89 percent water-free zinc sulphate.